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ENTOMOLOGICAL NEWS

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Remarks on the Larval Chaetotaxy of the Subgenus Melanoconion (Diptera: Culicidae)

BY JOHN N. BELKIN, University of California at Los Angeles

The study of the chaetotaxy of culicine mosquito larvae has not attracted many workers in the past, despite the fact that numerous investigators have utilized from time to time some of the elements of the chaetotaxy other than that of the head and distal abdominal segments for the diagnosis of species. The recent contribution (Foote, 1952) on the complete chaetotaxy of the subgenus *Melanoconion* of *Culex* is a welcome addition to the information now being gathered in this field. It is unfortunate that Foote disregarded the earlier work (Belkin, 1951) in which an attempt was made to review the chaetotaxy of mosquito larvae, both anophelines and culicines, and to provide criteria for establishing homologies, and where the complete chaetotaxy of a culicine mosquito was figured. As a result a number of misinterpretations were made in the case of those hairs which do not always occur in a regular numerical sequence, although some changes in nomenclature introduced in Foote's paper were identical with those proposed by Belkin. Further work on the larval chaetotaxy and its homology with the chaetotaxy of the pupa (Belkin, 1952, 1953) has shown that the criteria for homologies and the interpretations proposed by me are generally consistent. Therefore, I wish to point out at this time some of the discrepancies in the interpretations of the chaetotaxy as well as some errors in observations made by Foote. My observations were made largely on *Culex* (*Melanoconion*) *erraticus* (Dyar and Knab), 1905 from Wilson Dam, Alabama.

It is stated by Foote that hair 2 is absent on the head capsule of the subgenus *Melanoconion*. My material shows a small tubercle with a minute bristle at the level and caudad of hair 1, in a position somewhat mesad of the homologous but better developed hair 2 in *Culex quinquefasciatus* Say, 1823, in which hair 3 is also present.

The thoracic chaetotaxy has not been studied comparatively in the culicines and all the present interpretations show glaring discrepancies between segments and with the abdomen, so that no comment can be made at present. On the abdomen, several discrepancies must be pointed out. Despite a statement to the contrary, hair 0 is present in the subgenus on segments II through VIII, as it is apparently in the larvae as well as pupae of all mosquitoes. In the species examined by me it is about one-fifth the length of the pilosity and is located in the usual position. It is figured and labelled by Foote as hair 1 on Segment VIII; on this segment it is considerably larger and more conspicuous. Hair 14 was also missed on segments III to VII and was labelled 13 (cephalic) on segment VIII, on which it is also more conspicuous. It is slightly smaller than hair 0 on the corresponding segments and is found in the normal anterior intersegmental position. On the venter of the abdomen, I question the interpretation of hair 13 on segments III through V. It is much more likely that the hair labelled 13 is actually 11, hair 12 is hair 13 and hair 11 is hair 12. The few pupal hairs of this group that I have seen *in situ* in the fourth instar larva support my interpretation; furthermore hair 13 is almost always well developed. It appears unlikely that Foote's interpretation of hairs 11 and 12 on segment I is correct for in many culicines, perhaps all, hair 11 on this segment is absent in the older instars although it is usually present in the first instar, and hair 13 is always present. One would expect therefore the two hairs to be 12 and 13 on this segment. On segments VII and VIII the interpretations are confused. It appears that some of my interpretations were followed, despite a statement to the contrary, on segment VII as well as elsewhere, while on segment VIII reliance was placed directly on

the interpretations of Root (1924), Martini (1929) and Hurlbut (1938). On segment VII, except for failure to identify hairs 0 and 14, the interpretation appears to be correct. On my figures of this segment (Belkin, 1951, fig. 6 and 7) hairs 11 and 12 are labelled incorrectly and the terminology should be reversed. On segment VIII none of Foote's interpretations are in agreement with the preceding segment and all appear incorrect. The first pentad (7) in many sabethines has the same position, as well as degree of development, as hair I of abdomen VII and it can be interpreted as the same hair in anophelines, particularly if the first instar larva is examined (Belkin, 1953). The second pentad (6) is probably hair 5, for it is retained in the pupa and in that stage Knight and Chamberlain (1948) have homologized it with the corresponding hair on the other segments. The third pentad (9) is almost without doubt hair 7; the evidence from the pupal chaetotaxy is quite clear and again in the first instar anopheline larva its position is quite similar to that of the corresponding hair on segment VII. The fourth pentad (11) is in all probability hair 10 as shown by the first instar larva. Finally, the fifth pentad (caudal 13) cannot be hair 13 since it is present in the first instar larva and hair 13 is missing in this stage; it is most probably hair 12 (Belkin, 1953). Since all these homologies are not completely clear, it would be preferable to use the arbitrary terminology, such as proposed by me, particularly since it appears that the first and second pentads are reversed in the culicines as compared to the anophelines. The remaining two hairs on this segment are 0 (1) and 14 (cephalic 13).

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Some Observations on Stability and Uniformity in the Nomenclature of Larval Hairs (Diptera: Culicidae)

By RICHARD H. FOOTE, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture

One of the most serious problems confronting taxonomists today is the attainment of stability and uniformity in nomenclature. This ideal is slowly and gradually on its way toward realization, but only through a severe process of evolution involving the mutation of ideas and their selection and survival in the population of biologists concerned with the naming of animals. The attainment of the ideal of stability and uniformity in the nomenclature of the various parts of animals is just as desirable, but this must experience a similar process in which the same difficulties are inherent—those of the union of mind and of opinion.

This evolutionary trend has been carried a long way by those biologists who have studied, for instance, the serial homologies of the appendages of a crayfish. Though still not attaining universal acceptance of a single idea, they have agreed upon a more or less universal way of teaching and speaking about their

subject. On the other hand, those of us who have been studying the so-called "homologies" of mosquito larval and pupal hairs stand at the threshold of a long and, to some, very discouraging weeding process before general acceptance will ever be attained.

It is not the purpose of this contribution to discuss hair by hair the relative merits of the system of chaetotactic nomenclature proposed by Belkin (1950, 1952, 1953),[1] nor is it necessarily a defense of a somewhat similar system devised by Foote (1952) for the *Culex* subgenus *Melanoconion*. Rather, I should like to discuss several possible pitfalls, the awareness of which should help to guide us more soundly in our choice of any such system for what we commonly term "permanent" use.

We should be particularly careful in our use of the word "homology," in my opinion rather unfortunately employed in the various papers by Belkin and other authors, as well as in one by myself (1952). One of the most commonly employed criteria in the determination of the true homology of two or more structures is the similarity in their embryological and post-embryological development. Our progress in this direction in the study of the larval and pupal hairs of mosquitoes has not yet attained a level where the accumulated volume of observations allows us to employ any such criterion fairly. For instance, the study of first larval instars of a majority of suprageneric groups must certainly be a prerequisite for such a program. Furthermore, attempts to homologize larval with pupal hairs, as exemplified by the work of Baisas and Pagayon (1949),[2] Belkin (1952) and others, although consisting of carefully considered observations, really lack basic research in revealing the true physical and morphogenetic relationships involved. These authors have compared the relative positions and degree of development of larval and pupal hairs simply by

[1] For most references see paper by J. N. Belkin in this issue of ENT. NEWS.

[2] BAISAS, F. E., and A. U. PAGAYON. 1949. Notes on Philippine mosquitoes. XV. The chaetotaxy of the pupae and larvae of Tripteroides. Philippine Jour. Sci. 78: 42–72.

observing the latter through the more or less transparent cuticle of the well-developed fourth larval instar. Even though this method of attack represents a distinct step forward, it is at best only suggestive, and the number of interpretations of the data thus gathered can be, and often is, as great as the number of observers. In my study of pupal chaetotaxy in two subgenera of *Culex* (Foote, 1953),[3] the past and current lack of uniformity in the nomenclature of hairs is reflected in a table in which 13 different systems are compared. All of these systems have been proposed since 1920.

I have shown (unpublished data) that it is possible to immobilize mosquito larvae and alter the character of the pupal hairs developing under the larval integument by cauterizing the hair-forming areas of the larval cuticle. By using pupal hairs as markers in this way, workers may well evolve data that lie beyond the bounds of dispute. Experiments such as this will place our discussions on a basis that is more than pure speculation, and only then will we begin to resolve the more serious differences of opinion among us.

Those who have used the appendages of the crab and crayfish for their studies of serial homology point to the previous existence of a common ancestor which possessed a long series of very similar biramous appendages. It is believed that these appendages have changed in structure through mutation and selection until relatively large differences in structure from segment to segment have resulted. Again we see that our choice of the word "homology" may not be an apt one, since I believe we have not gone far enough back along the line of descent. In the end we may find an answer to this problem of hair nomenclature in an organism distantly removed from the group rather than in a member of the group itself.

Without doubt, Dr. Belkin has been aware of these and many other pitfalls. His work shows evidence of a careful appraisal of the available information, and doubtlessly he is correct in numbering many of the hairs. The volume of information that

[3] Foote, R. H. 1953. The pupal morphology and chaetotaxy of the Culex Subgenera Melanoconion and Mochlostyrax. Proc. Ent. Soc. Wash. 55: 89–100.

he has brought to bear on this problem is much greater than I was able to assemble during the short period of my study of *Melanoconion*. That study was a victim of bad timing in a way, since thesis deadlines were inflexible, and by the time Dr. Belkin's nomenclature was available for use the system that I had devised had already been applied to most of the larval descriptions involved in the taxonomic work. It was designed primarily for use as an urgently needed tool which could be used for these descriptions. I sincerely regret the implications of universality which I may have written into this paper; yet as a tool it served a very useful purpose—to name the hairs of a restricted group of insects. However, it is my sincere hope that, as this nomenclature evolves, workers will devote more time to basic research and experimentation such as has been briefly indicated above. Facts, rather than intuition, should become the basis for our speculation.

A Modification of Hopkins' Technique for Collecting Ectoparasites from Mammalian Skins [1]

By Edwin F. Cook

In the course of a study on the populations of Anoplura on wild mice Hopkins' (1949)[2] technique of dissolving the hair of the mammalian host skins in caustic potash has been employed. By this means one can readily recover the total louse population of an individual skin. Other procedures that have been employed in the past—brushing, searching and the use of detergents—were considered but discarded; the first two procedures because too many parasites are overlooked and the latter because it is too time-consuming in addition to being unlikely to yield the total population of parasites. A comparison of the searching and brushing technique with the caustic potash

[1] Paper No. 2981, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minn.

[2] Hopkins, G. H. F. 1949. Host associations of the lice of mammals. Proc. Zoo. Soc. London 119: pp. 396-397.

method was made by first removing those parasites that could be seen upon a careful examination and then carefully brushing the specimen to remove any additional parasites. Following both of these treatments the skins were dissolved in caustic potash, and in all instances many additional parasites were recovered.

Hopkins' procedure involves initially soaking the skin of the mammalian host in cold 5% KOH for 15 minutes, after which the hair is scraped from the skin and the skin discarded. This particular step is rather tedious and some parasite specimens are likely to be lost by adhering to the skin. With over 400 dried skins to examine in the investigation noted above, the amount of time spent in scraping the hair from the skin became excessive. The following modification was then adopted with excellent results. Further, this procedure eliminates one of the possible sources of error in sampling the population of the ectoparasites. It should be noted, of course, that these results were obtained with the dried skins of small rodents: *Clethrionomys, Microtus* and *Peromyscus*. Whether or not it would be effective with larger animals is uncertain.

Dried skins are cut into small pieces (1 to 2 inches square) and placed in a 125 ml. Erlenmeyer flask with 50 ml. of 3% trypsin (4 × U. S. P. pancreatin) buffered to a pH 8.3 ± with .2 molar Na_2HPO_4. This is placed in an oven at 37° C. for 36 to 48 hrs. Following this initial digesting period, 10 gm. KOH and 50 ml. H_2O are added, and the resulting mixture is boiled for several minutes or until all of the hair and the skin have dissolved. This liquid is then strained through an 80 mesh bronze screen (folded to a conical form). The small amount of debris remaining on the sieve is washed gently with tap water and the screen inverted into a petri dish. The specimens are washed off the screen into the dish by a small stream of water from a washing bottle or the tap. Any parasite specimens still adhering to the screen are found by examination of the screen under a dissecting microscope. The specimens, now in the dish with very little debris, can be readily discerned at 15 × with a dissecting microscope. First instar nymphs of

the Anoplura as well as all larger instars are retained completely by the screen. Mites are also recovered by this process; even the Listrophoridae although these are so small that some do pass through the 80 mesh screen. With this modification 20 or 30 skins can be brought through their initial digesting with much less time and effort than that involved in skin scraping, and no lice are lost in the process.

The parasite specimens are largely cleared by this process, and aside from some manipulation to remove the dissolved body contents, they are ready for staining and mounting in appropriate media. Lice and mites prepared in this fashion are undamaged and make excellent mounts. The latter is not the case where prolonged boiling of the skins in caustic potash has been attempted nor where heat and pressure have been used to digest the skins.

A Frigartus from California and an Erythroneura from South Dakota (Homoptera: Cicadellidae)

By Dorothy J. Knull, Department of Zoology and Entomology, The Ohio State University, Columbus, Ohio

Frigartus obesus n. sp. Figures 2, 3, 5, 6.

Resembling *Frigartus frigidus* (Ball)* but longer, less robust, and with smaller median spots on vertex and dark basal angles of scutellum.

Robust, cream-colored, marked with black and brown. Head broadly rounded to front, margins almost parallel, a large round spot between ocellus and eye on anterior margin, another comma-shaped, smaller spot either side on apex, small irregular spots and lines along base, eyes dark. Pronotum pale anteriorly, with sparse transverse lines on posterior two-thirds; scutellum pale with a black triangle in each basal angle, and

*Ball, E. D., Ent. News 10: 172, 1899.

small triangular spot either side below median transverse impressed line. Elytral veins broadly pale, cells embrowned, apical cells darker. Below, face pale with seven short arcs either side, sutures and spot above antenna dark.

♂.—Valve short, blunt; plates broader than valve at base, long, narrowing gradually on sides to sharp appressed tips, covering pygofer, twice as long as valve. Inner genitalia as illustrated.

♀.—Last ventral segment longer than preceding, margin straight, slightly excavated on median two- thirds between produced sides.

Length: ♂ 4.1 mm.; ♀ 4.5 mm.

Described from specimens collected in CALIFORNIA by D. J. & J. N. Knull. ♂ *holotype* and 3 ♂ *paratypes, allotype* and 1 ♀ *paratype,* Chester, July 1, 1951; and 1 ♀ *paratype,* Clear Lake, June 18, 1941. Types to be deposited in the Collection of The Ohio State University.

Erythroneura (Erythridula) pura n. sp. Figures 1, 4.

In form of inner ♂ genitalia near *E.* (*E.*) *nitida* Beamer,† but style with a longer, narrower posterior point.

Small, ground color cream on vertex, pronotum and body, of elytra white; color markings scarlet. Vertex with inverted V not touching eyes, narrower at apex; continued across pronotum as broad, slightly diverging irregular vittae reaching both margins; scutellum white, basal angles narrowly outlined with orange except basally, and apex orange; claval stripe broad in basal two-thirds, narrowly following suture in apical third to apex, corial vitta narrow, costal margin orange-tinged before plaque, apices slightly smoky.

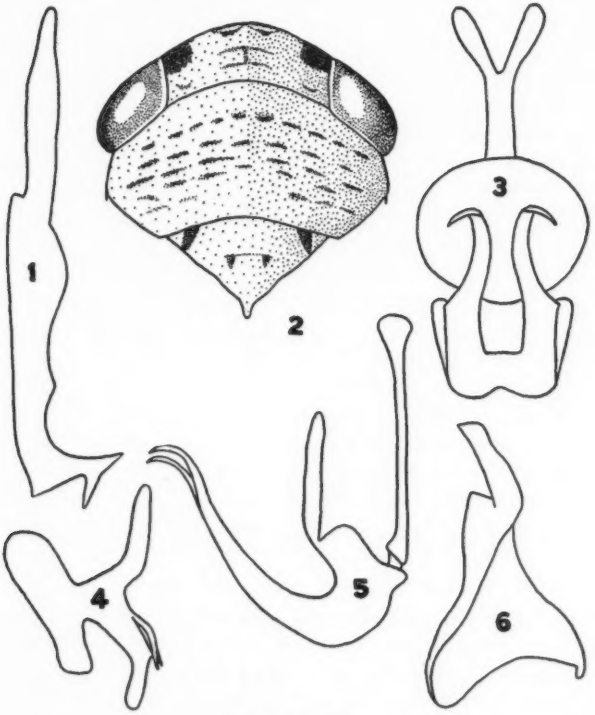
Inner ♂ genitalia as illustrated.

Length: ♂ 2.6 mm.; ♀ 2.7 mm.

A large series, ♂ *holotype, allotype* and *paratypes* of both sexes collected in SOUTH DAKOTA by Dr. H. C. Severin at Spearfish, Sept. 10, 1948. Other paratypes from Badlands, Wall, July 26, 1948; Elk Point, Sept. 14, 1948; Ft. Pierre, June

† BEAMER, R. H., Journ. Kans. Ent. Soc. 8: 103, 1935.

17, 1947 and Aug. 6, 1948; Hot Springs, Sept. 11, 1948; Lead, Sept. 11, 1948; Martin, Sept. 11, 1948; Springfield, Sept. 18, 1948. Holotype, allotype and paratypes in collection of writer, paratypes to be deposited in collections of Dr. Severin and The Ohio State University.



FIGURES 1–6

1. *Erythroneura* (*Erythridula*) *pura* n. sp., lateral view of style. 2. *Frigartus obesus* n. sp., head, pronotum, scutellum. 3. *Frigartus obesus* n. sp., ventral view of aedeagus. 4. *Erythroneura* (*Erythridula*) *pura* n. sp., lateral view of aedeagus. 5. *Frigartus obesus* n. sp., lateral view of aedeagus. 6. *Frigartus obesus* n. sp. style.

Concerning the True Identity of Strigamia fulva Sager and Strigamia bothriopa Wood (Chilopoda: Geophilomorpha: Dignathodontidae)

By Ralph E. Crabill, Jr., Department of Entomology of Cornell University, Ithaca, New York

In a way it is not surprising that *fulva* has been confused with *bothriopa* for so many years considering the disorder that has always enveloped the genus and the nebulous beginning of *fulva* in 1856. In that year Sager published a very short paper wherein he described several millipedes and a single chilopod, *Strigamia fulva,* which he characterized very superficially even for his era. The next person to refer to *fulva* was H. C. Wood, who, in 1862, published a redescription of it and repeated that diagnosis in 1865. Although Wood's characterization leaves much to the imagination, he at least noted the number of legs and the distinctive prehensorial basal tooth and, like Sagar, assigned it to Gray's *Strigamia.* There can be little doubt that he had examined the typical series in Philadelphia. In 1862 Wood also described another new species, *Strigamia bothriopa* from Philadelphia, a form which he obviously considered sufficiently distinct from Sager's *fulva* to justify his according it specific rank. He noted that it was "bright red" and robust, whereas *fulva* was yellowish-orange and "a graceful little animal."

In 1886 Meinert, working at the Museum of Comparative Zoology at Harvard University, hesitatingly regarded the two forms as conspecific, but, surprisingly enough, his solution was to recognize *bothriopa* as valid and to place *fulva* in that species' synonymy, at the same time transferring both to *Scolioplanes* of which he was co-author. His action probably influenced Bollman for, when the latter's notes were published posthumously in 1893, he had included *bothriopa* in the synonymy of *fulva* and had referred both to Koch's 1847 genus *Linotaenia.* It is likely that the action taken by these two workers has influenced all subsequnt investigators down to the present time.

In 1896 O. F. Cook declared that he was unable to separate

Meinert's *robusta* from Sager's *fulva,* but it is clear that he considered *bothriopa* [1] conspecific with *fulva.* In the same article he suggested that considerable intraspecific variability must be taken into account; undoubtedly he attributed the larger size, pronounced robustness, crimson color, and so on of *robusta* [= *bothriopa*] to be the normal variation one might expect in the two forms that he considered referable to *fulva.* In 1912 Chamberlin again synonymized Wood's species with *fulva.* He discussed and figured what he took to be the true *fulva,* but from the information presented in the article I believe that he was actually dealing with specimens of *bothriopa.* The plethora of references to *fulva,* with its supposed synonym, *bothriopa,* in the writings of both American and continental authors since Bollman's time, together with the apparent rarity of the true *fulva* and its subtle but unquestionable morphological lack of conformity with those forms properly referable to *bothriopa* have perpetuated the erroneous Meinert-Bollman synonymical precedent.

It is possible to show, however, that the two forms are by no means conspecific. I have examined the typical series of *fulva,* which, through the faithful care accorded it by the staff of the Academy of Natural Sciences of Philadelphia for nearly a century, is still in excellent condition. These specimens were found to conform to the diagnosis presented here.

The most striking characteristic of *fulva* is the presence of more than the usual four preclypeal setae, a feature detected in none of the American or European congeners that I have examined.

Strigamia fulva Sager

Strigamia fulva Sager, Proc. Acad. Nat. Sci. Phila., VIII, p. 109, (1856).
Scolioplanes bothriopus (Wood),—Meinert, Proc. Amer. Phil. Soc., XXIII, p. 222, (1886).
Strigamia bothriopa Wood,—Bollman, Proc. U. S. Nat. Mus., XI, p. 341, (1888).
Linotaenia fulva (Sager),—Bollman, Proc. U. S. Nat. Mus., XI, p. 341, (1888).

[1] Amer. Natural., XXX, pp. 239-242 (1896).

Tomotaenia fulva (Wood),—Cook, Amer. Natural., XXIX, p. 866, (1895).
Linotaenia bothriopa (Wood),—Chamberlin, Bull. Mus. Comp. Zool. Harv., LIV, p. 409, (1912).
Linotaenia robusta (Meinert),—Chamberlin, Bull. Mus. Comp. Zool. Harv., LIV, p. 409, (1912).
Scolioplanes fulvus (Sager),—Attems, Tierreich, LII, p. 228, (1929).
Scolioplanes bothriopus (Wood),—Attems, Tierreich, LII, p. 228, (1929).

This species may be readily distinguished from all other eastern North American forms by its possession of a laterally divided ultimate pedal pretergite and by the preclypeal setae which always number more than the customary four.

Specific Diagnosis. Length: to 40 mm., most specimens averaging 30–35 mm. *Color:* fulvous in life and in alcohol, infrequently with a faint pinkish tinge anteriorly and posteriorly, never uniformly pinkish nor crimson. *Pilosity:* relatively densely pilose, reflecting the habitus characteristic, apparently, of most American, Asiatic and only a few European forms. *Antennae:* ultimate article distinctly longer than the penultimate. *Preclypeal setae:* 14–16 in number, approximately equidistant and regularly disposed along the anterior margin of the clypeus, (fig. 9). *Labrum:* midpiece weakly sclerotized, the pale teeth detected with difficulty, (fig. 4), the whole contrasting noticeably with the strongly sclerotized and deeply pigmented epipharynx. *First maxillae:* telopodite lappets completely lacking.[2] *Prehensorial segment:* prosternum broad and short, uniformly or almost uniformly fulvous; ungula rather short, weakly curved, basal tooth thumb-shaped or conical, not subquadrate, (fig. 2); poison calyx[3] strictly cordiform, typically slightly longer than wide, (fig. 5). *Ultimate pedal segment:* with distinct lateral sutures, each separating the pretergite

[2] *Strigamia chionophila* Wood, a widespread American form, is distinctive in possessing two definite pairs of lappets which often escape detection unless they are suitably stained.

[3] The poison calyx is the expanded sclerotized proximal terminus of the poison canal; the entire apparatus is readily seen in macerated specimens.

from its pleurites, (fig. 10); coxopleural pores numbering some 8–12, the majority large. *Pedal segments:* 47–53.

Distribution. From the foregoing discussion it must be clear that many of the records attributed to *fulva* probably were based upon specimens of *bothriopa,* which is by far the commoner of the two species. The following records, therefore, are only those for which I can personally vouch: CONNECTICUT: Mt. Higby Reservoir, Hartford county! NEW YORK: Ithaca! (many specimens); Watkins Glen! Elmira! Taughannock Falls State Park! The typical locality is unknown; possibly it is in the state of Pennsylvania. Wood, who was familiar with the types, reported the species from Pennsylvania and Illinois, but this information should not be considered absolutely trustworthy.

Strigamia bothriopa Wood

Strigamia bothriopa Wood, Journ. Acad. Nat. Sci. Phila. (n.s.) V, p. 46, (1862). [western Pennsylvania].
Strigamia flava Sayer [*sic*],—Meinert, Proc. Amer. Phil. Soc., XXIII, p. 222, (1886). [*lapsus calami* for *S. fulva* Sager].
Scolioplanes bothriopus (Wood),—Meinert, Proc. Amer. Phil. Soc., XXIII, p. 222, (1886).
? *Scolioplanes robustus* Meinert, Proc. Amer. Phil. Soc., XXIII, p. 224, (1886).
Linotaenia bothriopa (Wood),—Bollman, Ent. Amer., IV, p. 4, (1888).
? *Linotaenia robusta* (Meinert),—Bollman, Ent. Amer., IV, p. 4, (1888).
Tomotaenia bothriopa (Wood),—Cook, Amer. Natural., XXIX, p. 866, (1895).

Unlike *fulva, bothriopa* has but four preclypeal setae and a non-suturate ultimate pedal pretergite; in addition *bothriopa* is sordid red in life and brilliant crimson in alcohol, whereas *fulva* is usually yellowish-orange or at most faintly pinkish anteriorly and posteriorly. The southern *bidens* Wood possesses 65–81 pairs of legs and so contrasts conveniently with bothriopa which bears fewer pairs of legs. The color of the prosternum and the shape of both the prehensorial basal tooth and of the poison calyx are also notably different in the two species. Like that of *bothriopa* the ultimate pedal pretergite of

bidens is undivided laterally as are those of the European species *acuminata* (Leach) and *crassipes* (C. L. Koch) to which *bothriopa* bears a superficial resemblance. However, *bothriopa* lacks the conspicuous elongate sternital sulci of *crassipes* (best seen in cleared material), and it also differs from the evidently closely allied *acuminata* in a number of subtle characters. The ultimate antennal article of *bothriopa* is markedly broader and longer than the penultimate one, but the two are of about the same breadth and length in the Leach forms that I have examined. The number of pairs of legs is higher in *bothriopa* (47–53) than in *acuminata* (33–47). The legs and sternites of *bothriopa,* like those of the Asiatic *hirsutipes* (Attems), are relatively densely clothed with long setae, whereas those of *acuminata* are sparsely, shortly setose. Very distinctive is the difference in labral midpieces. That of the American form is relatively weakly sclerotized; its fimbriae appear very pale and are almost invisible unless stained with mercurochrome or acid-fuchsin. The labral midpiece of *acuminata,* (fig. 1), on the other hand, is well sclerotized and distinctly pigmented; its fimbriae are relatively strong and rather short.

Specific Diagnosis. Length: to 60 mm., averaging 40–50 mm. *Color:* in life sordid red, changing rapidly to brilliant crimson in alcohol, thereafter becoming sordid reddish-brown. *Pilosity:* relatively densely setose, especially the legs and sternites. *Antennae:* ultimate article much broader and considerably longer than the penultimate. *Preclypeal setae:* always four in number, medially situated, (fig. 7). *Labrum:* rela-

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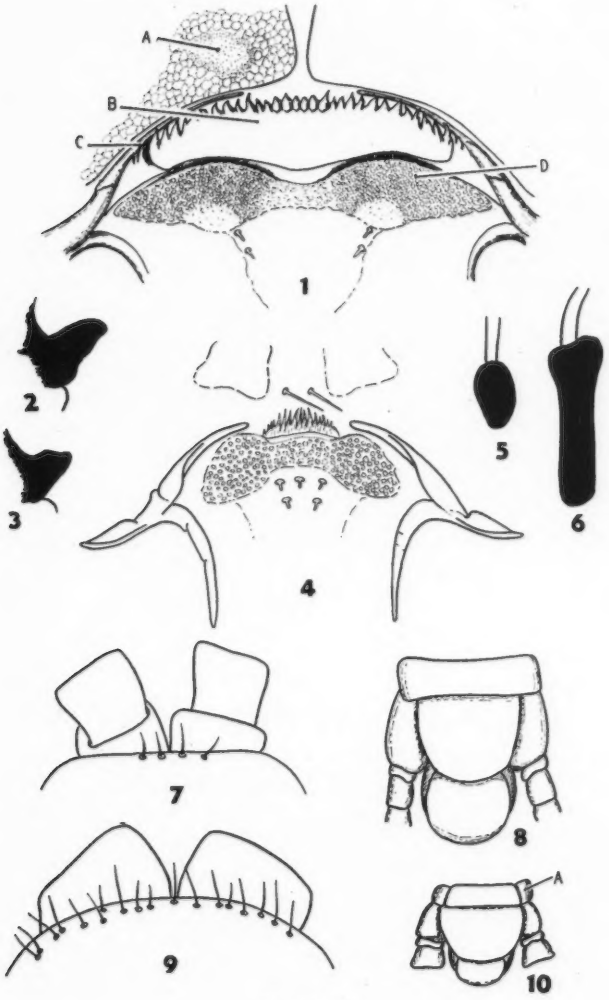
EXPLANATION OF FIGURES

1. *Strigamia acuminata* (Leach). Labrum. A. clypeal consolidated area, B. midpiece, C. side-piece, D. epipharynx. 2. *S. fulva* Sager. Right prehensorial basal tooth. 3. *S. bothriopa* Wood. Right prehensorial basal tooth. 4. *S. fulva* Sager. Labrum. 5. *S. fulva* Sager. Prehensorial poison calyx. 6. *S. bothriopa* Wood. Prehensorial poison calyx. 7. *S. fulva* Sager. Anterior margin of clypeus showing the four preclypeal setae. 8. *S. bothriopa* Wood. Ultimate pedal and post-pedal segments of a female (dorsal). 9. *S. bothriopa* Wood. Anterior margin of clypeus showing the numerous preclypeal setae. 10. *S. fulva* Sager. Ultimate pedal and post-pedal segments of a male. A. pleurite separated from pretergite (dorsal).



FIGS. 1–10.

tively weakly sclerotized, thus differing markedly from those of *acuminata* and *crassipes*. *First maxillae:* telopodite lappets absent or at most represented by barely perceptible and weakly pilose swellings. *Prehensorial segment:* prosternum very broad and short, reddish except for an elliptical anterio-medial white area which may at times be weakly bilobed posteriorly; ungula rather weakly curved, relatively short, evenly attenuate, basal tooth subquadrate, blunt and broad, (fig. 3); poison calyx very long and thin, its upper fifth abruptly expanded, (fig. 6). *Ultimate pedal segment:* pretergite without lateral sutures, fused completely with its pleurites, (fig. 8); coxopleural pores numbering some 20–40, all small. *Pedal segments:* 47–53.

Distribution. Because this species has long been confused with *fulva* I have cited only those distributional records that I consider reliable. MASSACHUSETTS. NEW YORK: West Danby! Ithaca! Robert Treman State Park! Taughannock Falls State Park! Slatersville! Lloyd-Cornell Reserve! Lisle Center! Ringwood Wild Flower Preserve! Steuben county! PENNSYLVANIA: "western Pennsylvania." VIRGINIA: Clifton Forge! Yorktown! Charlottesville! Griffith! Riceville! Lowmoor! Mt. Rogers, Grayson county! Jordan Mines! KENTUCKY: Louisville! INDIANA: Upland! Bloomington; Boswell; LaFayette; Westfield; Greencastle; Salem; Brookville; New Providence; Wyandotte.

Current Entomological Literature

Compiled by VENIA T. PHILLIPS, Librarian

Academy of Natural Sciences of Philadelphia

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania pertaining to entomology, including all arthropods except Crustacea. Coverage will be world-wide as regards major contributions to systematics as well as for all papers on morphology, physiology, embryology, etc. In addition, for species from the Americas and the Pacific (Nearctic, Neotropical and Polynesian regions) all minor contributions to taxonomy, distribution, etc., will also be recorded.

This list gives references of the year 1953 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Argentina. Minis. Ejército de la Nación. Dir. General de Sanidad.—Primeras jornadas entomoepidemiológicas nacionales. [133] 16: 48. **Hickin, N. E.**—An aquatic larva, suitable for laboratory work. [98] 172: 874.

BIOGRAPHIES, OBITUARIES—Attems, Carl, 1868–1952.—Obituary with biobibliography by E. Dartevelle. [Annales Mus. Roy. Congo Belge, Tervuren. Sci. zool., sér. in 8°] 18: vii–xii, (1952.) 1953. **Boerner, Carl,** 1880–1953. —Obituary by W. Roepke. [57] 14: 381–82. **Moral Romero, Jose Dario,** 1885–1941.—Biography by R. Leví-Castillo. [Rev. Ecuator. Ent. y Parasit.] 1: 7–9, port.

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ments of caddis larvae. [77] 30: 235–37. **Fröbrich, G.**—Darstellung von konzentraten des tribolium-image-faktors (T I F) und seine vermutliche chemische natur. [100] 40: 344. **Gese, E. C.**—Embryogeny of the Japanese beetle, Popillia japonica Newman, and a correlation of morphological events with known physiological changes. [16] 117: 572. (Abstract.) **Harnisch, O.**—Peroxidbestimmungen an larven von Chironomus thummi in aerobiose und anaerobiose. [100] 40: 345. **Hartung, E. W.**—Certain plant growth stimulators as causative agents in the aggregation of tumorous masses in Drosophila melanogaster. [16] 117: 626. (Abstract.) **& D. Herman.**—Culture age as a factor influencing tumorous aggregations in Drosophila melanogaster. *Ibid.* 627. (Abstract.) **Harvey, W. R. & C. M. Williams.**—Changes in the cyanide sensitivity of the heart-beat of the Cecropia silkworm during the course of metamorphosis. [16] 117: 544. (Abstract.) **Hovanitz, W.**—Natural hybridization in Eurasiatic Colias hyale and C. croceus. [16] 117: 647. (Abstract.) **Hoyle, G.**—Potassium ions and insect nerve muscle. [77] 30: 121–35. **Johnson, B.**—Flight muscle autolysis and reproduction in aphids. [98] 172: 813. **Kato, M.**—The metabolism of niacin in insects. [Science] 118: 654. **Ketchel, M. M. & C. M. Williams.**—Isolation of the intracellular symbiont of the roach. [16] 117: 650. (Abstract.) **Lefevre, G., Jr. & F. J. Ratty.**—A constructive genetic effect of X-rays in Drosophila melanogaster. [16] 117: 647. (Abstract.) **Leston, D.**—Phloeidae Dallas: systematics and morphology, with remarks on the phylogeny of Pentatomoidea Leach and upon the position of Serbana Distant. [117] 13: 121–40. **Lüdtke, H. & H. Hopp**—Ueber gewebschäden bei Pediculus vestimenti nach einwirkung chlorierter kohlenwasserstoffe (DDT, HCC, Matacid). [100] 40: 346–47. **McElroy, W. D.**—Biochemistry of firefly luminescence. [16] 117: 593–94. (Abstract.) **Nabours, R. K. & F. M. Stebbins**—Dimorphism of wing-pronotal lengths and teratoses in biparental and partheno-propagation of the grouse locusts (Tetrigidae). [78] 124: 1–30. **Niethammer, G.**—Tiergeographie (Bericht über die Jahre 1943—1949). [Fortschritte der Zool.] 9: 368–421, 1952. **Pappenheimer, A. M., Jr. & C. M. Williams**—The properties of cytochrome E in the Cecropia silkworm. [16] 117: 543. (Abstract.) **Ramsay, J. A.**—Exchanges of sodium and potassium in mosquito larvae. [77] 30: 79–89. **Salkeld, E. H. & C. Potter.**—The effect of the age and stage of development of

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ORTHOPTERA—Canning, E. U.—(See Anatomy.) **Costa Lima, A. da & I. da Costa Leite.**—Um novo grilo carvernícola (Gryllidae, Phalangopsinae). [1] 25: 167–70. **Ellis, P. E.**—(See Anatomy.) **Judd, W. W.**—The European praying mantis, Mantis religiosa L., at London, Ontario. [Can. Field Nat.] 67: 182. **Kevan, D. K. McE.**—A preliminary list of the Mantodea of Trinidad, B. W. I. [19] 12th ser. 6: 809–16. **Le Berre, J.-R.**—Contribution a l'étude biologique du criquet migrateur des landes (Locusta migratoria gallica Remaudière). [39] 87: 227–73. **Nabours & Stebbins**—(See Anatomy.) **Nutting, W. L.**—(See Diptera.) **Rehn, J. A. G.**—Records and descriptions of Pyrgomorphinae (Acrididae), with critical notes on certain genera. [9] 79: 99–150, ill. (*). **Richards, O. W.**—The study of the numbers of the red locust, Nomadacris septemfasciata (Serville). [22] no. 15, 30 p. **Sheppard, P. M.**—(See Anatomy.) **Slifer, E. H.**—(See Anatomy.) **Verron, H.**—(See Anatomy.)

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